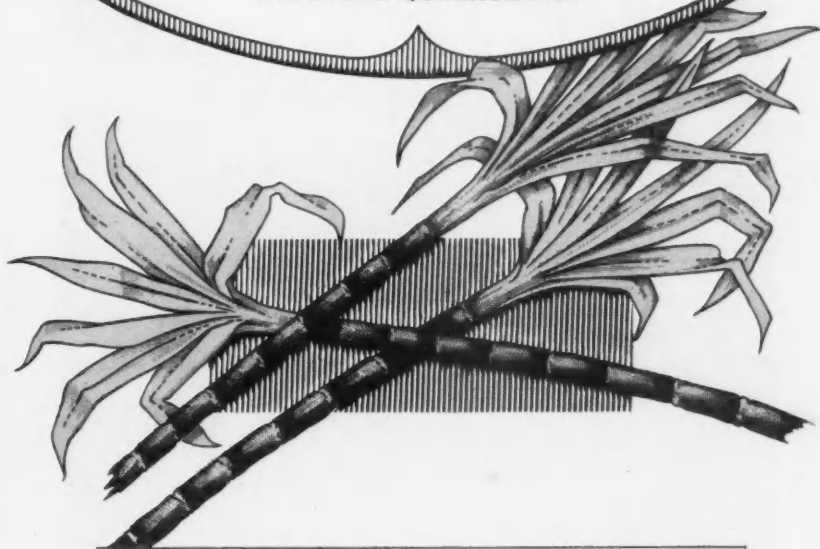


DEPARTMENT OF AGRICULTURE AND STOCK.

The **CANE GROWERS' QUARTERLY BULLETIN**

ISSUED BY
**BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE. QUEENSLAND.**



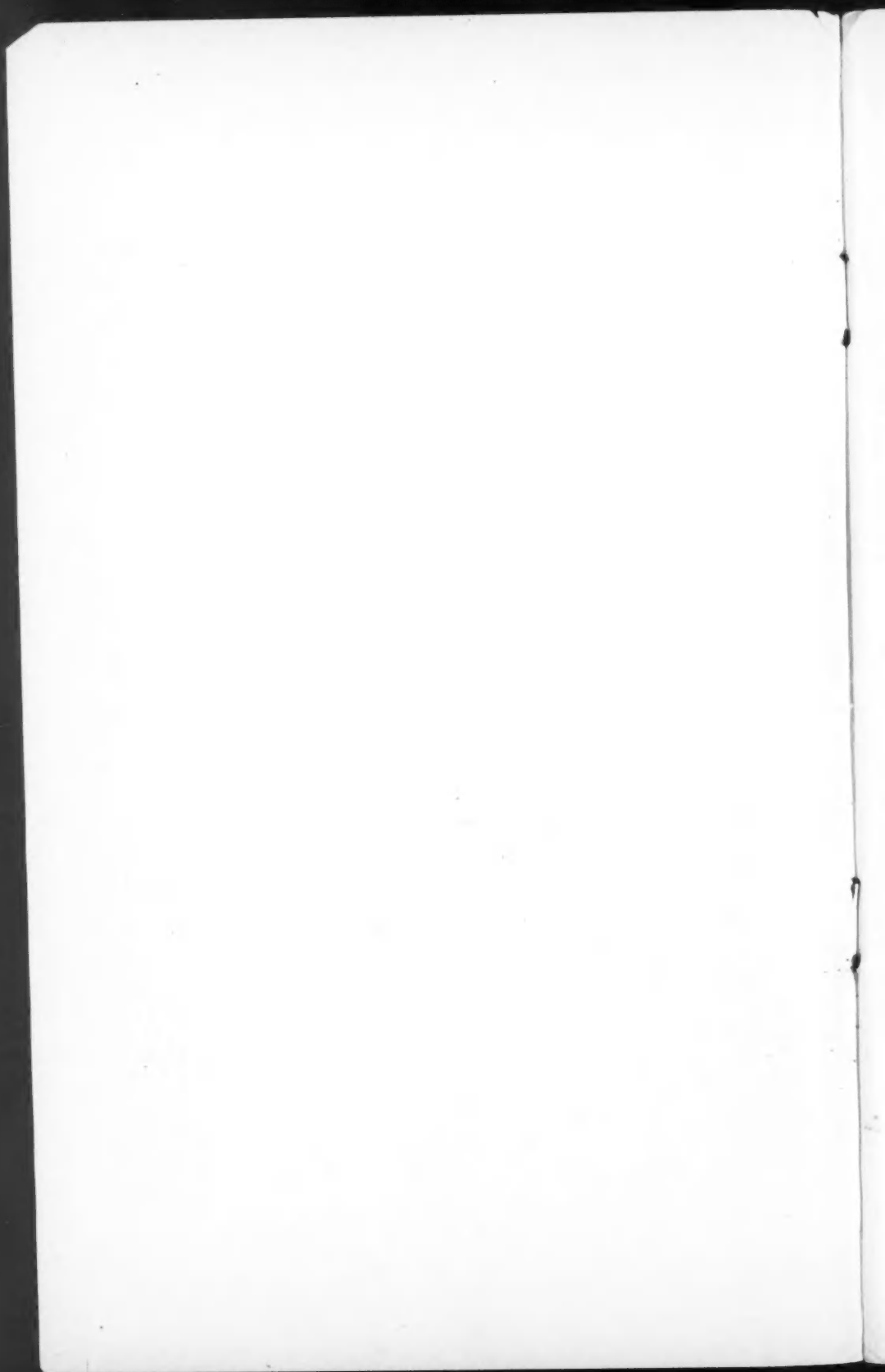
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Contents.

—
Review of the Work of Experiment Stations
and
Farm Fertility and Varietal Trials.
1934 Season.

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BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

THE
CANE GROWERS'
QUARTERLY BULLETIN

ISSUED BY DIRECTION OF THE
HON. F. W. BULCOCK, MINISTER
FOR AGRICULTURE AND STOCK

1 JANUARY, 1935

DAVID WHYTE, GOVERNMENT PRINTER, BRISBANE



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The Cane Growers' Quarterly — Bulletin —

VOL. II

1 JANUARY, 1935

No. 3

Review of the Work of Experiment Stations 1934 Season

Introduction

The results of the work of the Sugar Experiment Stations for the past year have been recorded as usual, in the Annual Report of the Director. This report is not distributed freely amongst growers, though copies are available to any who wish them. It is necessary to record therein a large amount of technical and mathematical detail in order to make the records of our experiments complete, and the cane grower is certainly not interested in these. It has therefore been decided to prepare a resume of the years' returns in simple, straightforward language which the farmer can understand, and present this summary in conjunction with the report on the Farm Plot Trials which are conducted each year by the Bureau.

It is hoped that this plan will appeal to all cane growers and that they will peruse the progress returns from the experimental plots, which have been set out with the object of assisting them in their agricultural efficiency.

Bureau Affairs.

Advisory Committee.

In July, 1933, an Advisory Committee was appointed by the Minister for Agriculture (the Hon. F. W. Bulcock). This Committee consists of two representatives of the canegrowers, two of the millers, and two Government representatives, with the Minister as Chairman. It was created by the Minister to assist and advise him with respect to Bureau matters.

During the past year the Committee met on three occasions, and several matters of vital importance to the Bureau were discussed. At the meeting held in March, the Chairman announced his intention of introducing a Bill to amend "*The Sugar Experiment Stations Acts, 1900 to 1923*," to provide for

an Advisory Board, constituted on the lines of the existing Committee. In order to enable the Government to give effect to certain of the recommendations of the Committee which involved increased expenditure from the Trust Fund, it was agreed that the amount of the Government endowment would be limited to £7,000 per annum (which is practically identical with that received from the Government annually during the past three years), and the balance of the expenditure would be contributed by the industry in the form of a levy on cane.

The Act has now been placed on the Statute Book, and its operations were put into effect with the 1934-35 financial year. The action of the Minister in placing increased responsibility on the industry, and in seeking the advice of its representatives in matters affecting the well-being of the Bureau, have been well received, and it is felt that this gesture will do much to effect closer co-operation with, and the more effective functioning of, an organisation which can do much for the benefit of all sugar producers.

Location of Experiment Stations.

The suitability of existing Experiment Stations was critically reviewed by the Committee. It was agreed that the operations of the Bureau in the far North could be rendered more effective by co-ordinating all services through one station located at Meringa. A reserve adjacent to the existing Meringa Entomological Station was transferred during the year to the control of the Bureau, and new buildings are being provided to supplement those already in existence, so that in a short time this will be a centre competent to serve Northern growers with greatly improved efficiency. Cane breeding, pathological, entomological, and general agricultural research work will be intensified by virtue of the increased facilities which are being provided.

The existing Mackay Station has always been a difficult area on which to effect satisfactory field trial work. The variability of the soil and the restricted acreage of suitable experimental land render it desirable to seek a more suitable site for the purpose. An area of the Palms Estate adjacent to the Te Kowai siding has therefore been purchased as the site for the new station, and arrangements are being made for the transfer of activities to the new location at an early date. The selected block contains 70 acres of average alluvial land, which will permit of an expansion of the trial plot work, and of the seedling propagation project, which aims at supplying the Central District with new and improved sugar-canes. Situated as it is on the main Pioneer Valley road, the new station will be more readily accessible to growers, which will doubtless be greatly appreciated.

It was agreed that the Bundaberg Station is quite satisfactory for experimental purposes, and future efforts will be concentrated on the equipment of a chemical laboratory for research and general routine work; a small irrigation plant has just been installed on the station, and this acquisition will permit of an expansion in the cane-breeding work, as well as providing for the study of irrigation problems at this centre.

Cane Breeding.

As usual, the supply of cane seed for all stations was obtained from arrows produced at South Johnstone and Freshwater. A further number of new parentage combinations were tested, while efforts were concentrated on the production of liberal supplies of seed from the crosses of proven value. Following on repeated selections and observational tests on seedlings raised at South Johnstone from 1927 to 1931, a final selection of twelve seedlings has been made. These have received the numbers Q. 1 to Q. 12; all future Bureau seedlings will be identified by the "Q" prefix letter. These twelve seedlings are being finally tested for their disease resistance and growth vigour, and the resulting crop will provide stocks of plants for extensive field trials under a range of climatic and soil conditions. One of these seedlings (Q. 1) is of particular interest in that it has given a c.c.s. value at maturity in excess of 22 per cent. No time will be lost in propagating this variety rapidly should it measure up to the required standards of growth vigour and disease resistance.

The seedling work at Mackay and Bundaberg has undergone a steady expansion, and it is anticipated that the number of new varieties raised at these centres will be rapidly increased to fifteen or twenty thousand annually. Several of the selected seedlings grown at Mackay during the past year are distinctly promising, and these should find their way into varietal trials against the district standard canes during 1935.

Northern Experiment Station, South Johnstone.

The trials harvested on this station during 1934 are the last which will be recorded at this centre under the control of the Bureau. As usual, the returns are decidedly interesting; that practically all trials were conducted on ratoons is probably a contributing factor, for the benefits from consistent applications of heavy fertilizer dressings are most marked on such crops. The following results summarise the outstanding features of the several experiments:—

Kinds of Phosphate.

An experiment which has now been carried through four crops tells us that ordinary superphosphate is equally as effective as basic super or "synthetic" phosphatic manures on this soil type.

Time of Manurial Applications.

In conjunction with the previous experiment, an attempt was made to determine the value of early and late dressings of fertilizer. On all crops early manuring was preferable, and this factor became increasingly important with ageing of the ratoons. The percentage crop increases for the four years were—

						Per cent.
Plant cane	..	..	..	..	..	1.7
First ratoons	..	..	..	..	..	5.0
Second ratoons	..	..	..	..	..	6.3
Third ratoons	..	..	..	..	..	8.3

Plant cane should therefore be fertilized in the planting furrow, with top dressings of sulphate of ammonia when the crop is stooling; ratoons should receive their mixed fertilizer at ratooning time, and the first top dressing of sulphate of ammonia three to four weeks later.

Molasses as a Fertilizer.

The second ratoon yields showed that the benefits from the molasses applied prior to the plant crop were still in evidence. The yield increases for the respective crops were:—

	Tons.				
Plant cane	12.9
First ratoons	11.0
Second ratoons	5.2
<hr/>					
Total gain	29.1
<hr/>					

A crop increase of almost 3 tons of cane per ton of molasses applied emphasises in no uncertain manner the value of this by-product in restoring the fertility of the land.

P.O.J. 2878 v. Badila.

On the plant crop (harvested in 1933) the Java "Wonder Cane" was but slightly superior to Badila in cane yield, while the c.c.s. was decidedly inferior. With the first ratoon yields, the Javan cane outyielded Badila by 10 tons per acre, thus demonstrating its remarkable ratooning qualities. However, the c.c.s. was three units below that of the North Queensland standard cane, and it must be concluded that from this point of view the new variety is disappointing under Northern conditions, particularly on land suited to Badila.

Stubble Shaver Trial.

A block of Badila third ratoons was divided into strips, one half of which were treated with the stubble shaver, while the balance were given the usual ratooning treatment. The yields show that cutting off the upper ends of the stubble at ratooning time was responsible for a crop increase of $2\frac{1}{2}$ tons of cane per acre. It is unfortunate that the treatments could not be repeated for a further season. Doubtless this practise would result in an increased number of profitable ratoon crops, particularly where the land becomes "hilled up" in ratoons.

Fertilizer Trial.

In continuation of past trials, a further attempt was made to determine the most profitable limit to which fertilizer dressings could be raised on this soil type, under favourable cultural conditions. Summarising the results of

these trials to date, the following is presented as a most suitable plant food treatment for the acid alluvial soil, at current sugar values :—

Crop.	Mixed Manure.	Sulphate of Ammonia.
	lb. per acre.	lb. per acre.
Plant cane (following green manure)	800*	150
Plant cane (following bare fallow)	800*	300
Ratoons	1,000†	400-600

* Sugar Bureau No. 1 Planting Mixture for Plant Cane.

† Sugar Bureau No. 1 Ratooning Mixture for Ratoons.

Central Experiment Station, Mackay.

Due to lack of suitable experimental blocks, only two trials were harvested at this station during the 1934 season, and the results therefrom are as follow :—

Fertilizer Trial.

This experiment was the nitrogen trial which has now been continued through three crops. It has been demonstrated that ratoons on alluvial lands give outstanding results from sulphate of ammonia, particularly in conjunction with mixed fertilizers. It is worthwhile recording the benefits from the progressively increasing applications of sulphate of ammonia employed on this block :—

Mixed Fertilizer with—	CROP YIELDS.		
	Plant Cane.	First Ratoon.	Second Ratoon.
	Tons	Tons	Tons
No sulphate of ammonia	15.5	21.0	11.5
125 lb. sulphate of ammonia	15.2	23.5	16.4
250 lb. sulphate of ammonia	14.9	26.1	17.7
375 lb. sulphate of ammonia	16.2	28.8	24.0
500 lb. sulphate of ammonia	17.1	29.5	24.3

As subsequent ratoons were harvested the value of the added nitrogen increased. On the successive crops, the benefits from the heaviest application of sulphate of ammonia were 1.6, 8.5, and 12.8 tons of cane respectively.

Trash Trial.

Two years ago preparations were made for a series of plots which would be subjected to the same treatment year after year. On one half of the number, trash and tops would be conserved annually, while on the balance the crop residue would be burned. Unfortunately, this project will be interrupted with the harvesting of the first ratoon crop, but it will be taken up again at the earliest opportunity on the new station. The plant cane which was harvested in 1934 yielded over 39 tons of Q. 813 per acre, and the crop was equally heavy on both treated and untreated plots. This type of experiment is doubtless one which must be continued for at least ten years in order that the true worth of the treatment may be gauged over a range of climatic conditions.

Southern Experiment Station, Bundaberg.

A number of interesting trial blocks were harvested from this area of red volcanic soil during 1934. It is worthy of note, also, that the average yield from the entire harvested area was $26\frac{1}{2}$ tons of cane per acre, and included no standover cane; this performance was due in part to each of the following factors:—(1) a favourable season, (2) the practice of autumn planting (plant Q. 813 yielded over 36 tons of cane per acre on two blocks), and (3) the superior ratooning qualities of the newly-adopted gum-resistant varieties. The results of the several trials will be discussed briefly under their respective headings:—

Planting and Cultivation Trial.

An attempt was made to determine the best interspace distance for Q. 813 on the red volcanic soil. Both 4 ft. 6 in. (standard practice) and 3 ft. 9 in. widths were employed, and the narrower spacing was responsible for a yield increase of 3.7 tons of cane per acre over the standard. Doubtless this trial should be extended over a series of years before drawing definite conclusions, but it is interesting to note that certain varieties at least might be planted at closer intervals to advantage. The cultivated and non-cultivated plots showed no significant difference in yields. On the latter, weeds were removed when they became troublesome, but systematic scarification was not resorted to. It is therefore suggestive that the value of surface cultivation on this self-mulching soil lies in the weed control which is thus effected, and the stirring of the soil is of little benefit.

Trash Trial.

This series of trash v. no trash plots was instituted two years ago, and it is proposed to continue the treatment over a long period of years in order to determine the value of restoring organic matter to the soil. The plant crops from "trash" and "no trash" plots were identical. On the ratoons the trash plots should reveal any of the benefits which follow the employment of the conserved trash as a surface mulch in alternate cane rows.

Methods of Trash Conservation.

A block of first ratoons was divided into plots, on which trash and tops from the plant cane were treated as follows:—(1) Burnt, (2) Rolled, (3)

Relieved, (4) Crop volunteered. The yields from all treatments were practically identical under the climatic conditions experienced. The trial is being continued to second ratoons.

Varietal Trials.

(1) The first of these trials embraced the ratoons from the plant crop reported last year. The varieties on this block include some of the most promising canes recently released as suitable, after rigorous gum-resistance trials. It will be recalled that these canes were decidedly superior to the standard (Q. 813) in the plant crop; in the ratoons they were even more outstanding in their greater growth vigour, as is seen from the following average yields:—

Variety.	Tons cane per acre.				
Co. 290	49.4
P.O.J. 2725	48.1
Co. 281	34.0
P.O.J. 234	31.6
26 C 188	25.2
Q 813	20.4
Manoa 304	17.8

Doubtless Co. 290, P.O.J. 2725, and P.O.J. 234 are destined to play an important part in the restoration of the cane industry in Southern Queensland.

(2) The second trial included a further series of resistant varieties, several of which showed definitely improved yields over the standard Q. 813. Comment on the value of these canes will be deferred until the first ratoon crop has been harvested.

Molasses Trial.

The first ratoons of this trial showed that applications of 6 and 8 tons of molasses per acre were progressively superior to 4 tons. It is recommended that 8 tons per acre of this material be employed at one dressing on the red volcanic soils. The yields were:—

	Tons cane per acre.				
8 tons molasses	24.6
6 tons molasses	23.7
4 tons molasses	20.9

Division of Entomology and Pathology.

The work of this division was productive of results of considerable interest to canegrowers in areas where diseases and pests are important factors in reducing crop yields. It is not proposed to review the results at this time, but they will form the subject of a series of short articles which will be presented by the officers of this staff in subsequent issues of the "Quarterly Bulletin."

Farm Fertility Trials.

Results of the 1934 Season.

It is our pleasure to present a further series of results, harvested from the farm fertility trials during the 1934 season. This project has now been under way for five years, and the returns to date have doubtless proved of immense value to the canegrowers and ourselves. It enables us to gather evidence of plant food deficiencies and fertilizer requirements over a much wider range of soil types than is possible by confining experimental plots to experiment station lands. Even a cursory glance at the results presented herewith will demonstrate the wide variation in response to the three plantfood constituents which make up a "complete" fertilizer mixture. Some soil types show outstanding benefits from heavy applications of sulphate of ammonia, which supplies the plantfood nitrogen (N); this is particularly true of the Burdekin soils. On the other hand, the acid alluvials demand large quantities of phosphate (P), which in these trials was supplied as superphosphate, while the red volcanic loams require a mixture particularly rich in potash (K) for the best results. Certain soils demand a mixture rich in two of the three plantfoods, while still others need heavy dressings of all three plantfoods.

VALUE OF MANURE FOR RATOONS.



Yields—15·8 Tons.

NK PLOT

{ 240lb. SULPHATE OF AMMONIA.
180lb. POTASH.

7·5 Tons.

CHECK PLOT.

No MANURE.

The yields illustrated above were from adjacent plots on MESSRS. CRAWFORD AND MUNTZ' FARM, MOSSMAN. Sulphate of ammonia produced outstanding results (see p. 63).

Unless the farmers knows the precise needs of his land and uses this information in the intelligent purchase of the correct fertilizer in the correct proportions, the full benefits from the money he expends in manures cannot be realised. It is therefore our aim to cover the important soil types as completely as possible with our farm trials, in order that the desired results may be available.

In studying the results of these experiments the grower should be careful to avoid returns from soil types different from his own. This is most important, and failure to observe this precaution may result in much unprofitable expenditure. For the grower on the red volcanic loams of Bartle Frere, the value of superphosphate on the adjacent alluvial loams is entirely worthless knowledge; while the behaviour of neither is of interest to the farmer producing crops under irrigation in the Burdekin delta. The trials themselves are necessarily of two distinct types: the first (and simplest) aims at determining the answer to the question—"What plantfood constituent (or constituents) does this soil type lack chiefly?" Having determined the answer, the next question is: "What proportions of the correct plantfoods will produce the most profitable return per acre?" The answer to the second question is obviously the reply which the canegrower desires most, but it is necessary for us to determine first of all the relative importance of these three foods before a suitable experiment of the second type may be designed. It will be found, therefore, that trials of both types are recorded in the subsequent pages of this bulletin. This may appear to confuse the issue somewhat, and to assist the grower who is not able to follow the ramifications of the methods employed, the discussions which follow each trial aim at simplifying the conclusions to be drawn from the results, wherever such are permissible.

A further point should also be stressed: that certain of the treatments employed record distinct losses is not to be regarded as proof of failure of the trial. On the contrary, the fact that some treatments show losses, and others (or one at least) produce a handsome profit, further supports the contention made earlier, that profitable results from fertilizers will be realised only where the correct mixture is applied in the correct proportion.

It will be observed that all recommendations have been made this year for the first time, in terms of the recently devised Sugar Bureau mixtures. A statement of the composition of these was given in an earlier issue of the "Bulletin," and all fertilizer distributing companies are able to supply them. The mixtures are numbered 1, 2, and 3, while each is supplied as the planting or ratooning variation, which should be used accordingly. It should again be stressed that none of these is complete in itself, and is to be regarded as a basal dressing only. Unless the grower is dealing with a plant crop of cane, *following green manuring*, subsequent top dressings of sulphate of ammonia are necessary. It is urged that growers accustom themselves to think of fertilizing practise as two distinct operations; firstly, a preliminary application of mixed manure to be applied in the drill when planting, or in a furrow alongside the ratoon stools at ratooning time; and secondly, a top dressing of sulphate of ammonia applied when the plant cane is stooling or the ratoons are about 18 in. high. Subsequent applications of this manure, if experience shows that these are necessary, should generally be given at 3 to 4-week intervals. Remember that two or three light applications of ammonia are more valuable than the same quantity applied in one dressing.

Values used in Calculations.

In computing the financial returns for the trials, the price of raw sugar has been assumed at £17 per ton. This should approximate fairly closely to the final price for No. 1 pool sugar. Fertilizer costs are based on current quotations, and full allowance has been made for freight charges to the respective districts. An allowance of 10s. per acre has been made for costs of handling and application, but no deductions have been allowed in respect of the 15s. per ton bonus which has again been declared by the Federal Government.

NORTHERN DISTRICTS.

Growing conditions in the far northern districts were anything but favourable during the past season. Excessive rains water-logged many soils, while unduly low temperatures and cloudy skies did not favour vigorous growth. Grubs, borers, and rats also took toll of the crop, and several of the experimental blocks were seriously affected. In view of these factors the yield of all trials was decidedly satisfactory; the average figures for the fully fertilized and non-fertilized canes of the seventeen experiments were:—

"Complete manure" plots	...	...	...	29.9 tons cane per acre
"No manure" plots	...	...	...	24.2 tons cane per acre
				—
Average increase due to fertilizer	...	...	...	5.7 tons cane per acre

The average gain due to fertilizer is decidedly lower than the figures recorded in 1932 and 1933, which were 8.6 and 9.3 tons respectively. When the plant crop and ratoon plots are classed separately, the outstanding benefits from artificial manures on ratoon crops is very evident:—

Average increase Plant cane	...	...	...	2.9 tons
Average increase Ratoon cane	...	...	...	7.7 tons

This fact becomes even more striking when the actual ratoon yields are contrasted—

Average fertilizer plots	...	...	...	28.4 tons per acre
Average "no manure" plots	...	...	...	20.7 tons per acre
				—
Increase	...	...	...	7.7 tons per acre

In addition to the beneficial influences of manure both on crop yield and on the fertility of the land, it is evident that the consistent use of the correct fertilizer mixtures paves the way for an increased number of profitable ratoons, which in itself usually means reduced production costs.

The results reported in this section cover a range of soil types, while the actual experiments differ in character among themselves. Some have been designed to determine which individual plant foods are of greatest importance, without regard to the quantity of each constituent in the mixtures employed. The second type aims at determining the relative amounts of the three plant foods which will give most profitable returns. Before attempting to apply the results of any of these experiments, growers should be sure that their soil conditions are similar to those under which the trials have been conducted. The grower with only red volcanic soil will have no interest in experiments harvested from alluvial lands, and *vice versa*.

* These include partially fertilized plots in certain trials.

Messrs. Crawford and Muntz's Farm, Mossman.**Soil Type.**—Acid alluvial loam. **Nature of Crop.**—First Ratoon.**Variety.**—Clark's Seedling.**Age of Crop.**—14 months.**RESULTS.**

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	11.3	16.4	..	..	..
240	360	..	16.5	16.1	3 0 0	5 6 0	..
240	..	180	15.8	16.9	3 5 0	5 19 0	..
..	360	180	13.3	16.7	2 14 0	1 12 0	..
240	360	180	17.1	15.8	4 2 0	2 12 0	..

DISCUSSION.

Prior to planting, the land was limed, and a fair crop of beans grown as a green manure crop. The results from the plant cane were reported last year. The increases brought about by the three individual plant foods for plant and first ratoon crops were—

Due to—								Plant Cane.	First Ratoons.
								Tons.	Tons.
Nitrogen	..	..	..	..	..	..	..	2.2	3.8
Phosphoric acid	..	..	..	..	..	..	..	5.0	1.3
Potash	..	..	..	..	..	..	..	1.6	0.6

The results of both years are consistent in that they show very little benefit from potash but whereas the plant cane gave excellent results from the superphosphate, the increase in the ratoons was due chiefly to nitrogen. This latter result is certainly in accordance with previous findings at Mossman, but the unusual flood and cyclone conditions which were experienced in 1934 make it unwise to draw definite conclusions. The cane was flattened by the wind in March.

It may be suggested, tentatively, that the acid forest soils of the area should first be limed, and a suitable planting mixture is Sugar Bureau No. 1, applied in the drill at the rate of 4 cwt. per acre. This should be supplemented by a top-dressing of sulphate of ammonia at the rate of $1\frac{1}{2}$ bags per acre when the crop is stooling. Ratoons should receive 4 cwt. per acre of Sugar Bureau No. 1 Ratooning Mixture at ratooning time, followed by two dressings of sulphate of ammonia, each of 1 bag per acre, at monthly intervals.

Rural School, Mossman.

Soil Type.—Acid alluvial loam.

Nature of Crop.—First Ratoon.

Varieties.—

Age of Crop.—11 months.

Black Innis.

D. 1135.

S.J. 4.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertiliser.	
Sulphate of Ammonia.	Super-phosphate.	Muriate of Potash.	Cane per Acre.	C.C.S. in Cane.		Profit	Loss.
(N)	(P)	(K)					
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	21.2	Average—13.0	..	..	..
210	300	..	30.9		2 13 0	7 12 0	..
210	..	150	21.7		2 16 0	..	2 6 0
..	300	150	27.7		2 8 0	4 9 0	..
210	300	150	29.6		3 12 0	5 5 0	..

DISCUSSION.

The interest displayed by the school pupils during the growth of the plant crop was sustained during the following ratoons. It will be recalled that the complete fertilizer on the plant cane produced a yield of 36.5 tons per acre, and the corresponding plots of this year were equally satisfactory. The total increase for fertilizer was 8.4 tons per acre, and as before, the increase was due almost entirely to phosphate, as is seen from the following analysis:—

Due to—								Plant Cane.	First Ratoons.
								Tons.	Tons.
Nitrogen	..	..	..	..	..	..	..	Nil	1.9
Phosphoric acid	..	..	..	..	..	..	..	7.5	7.9
Potash	..	..	..	..	..	..	..	0.2	Nil

Again no increase was recorded from potash, while sulphate of ammonia produced a gain of 2 tons per acre. On the basis of these results, similar treatment to that recommended for the preceding trial (p. 63) should prove satisfactory. Possibly the top-dressings of sulphate of ammonia could be reduced slightly, but the need for the full applications recommended will probably be felt as the land is retained in cultivation.

The varieties gave the following returns:—

					Cane per Acre.	C.C.S.
					Tons.	Per cent.
Black Innis	..	..	..	..	24.9	12.8
D. 1135	..	..	..	..	25.9	12.2
S.J. 4	..	..	..	..	28.0	13.9

Again S.J. 4 outyielded the older standards in both tonnage and c.c.s., though the disparity is not so great as for the plant crop. The new variety appears to demand a definite place in the planting programme of this area on the lands which are not suited to Badila.

R. D. Rex's Farm, Mossman.

Soil Type.—Old alluvial loam.

Nature of Crop.—Plant Cane.

Variety.—Korpi.

Age of Crop.—13 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia.	Super-phosphate.	Muriate of Potash.	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
(N)	(P)	(K)					
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	30.2	Average—15.1	..	..	..
360	300	..	28.9		3 11 0	..	5 7 0
360	..	180	29.1		3 19 0	..	5 9 0
..	300	180	31.7		2 11 0	..	0 10 0
360	300	180	30.9		4 13 0	..	3 14 0

DISCUSSION.

The land received an application of 2 tons of crushed lime when in fallow, and a good crop of beans was also ploughed under prior to planting the cane. Good soil moisture conditions were experienced during the spring and the crop made rapid progress. The cyclone in March uprooted most of the stools, and probably 20 per cent. of the crop was subsequently damaged by rats. These facts serve to explain the erratic nature of the results recorded; apparently fertilizers were without influence on the yield, but this is doubtless an unwarranted conclusion.

Acacia Bank Farm, Stratford, Cairns.

Soil Type.—Alluvial loam.

Nature of Crop.—Second Ratoon.

Variety.—Badila.

Age of Crop.—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	29.9	..	..	..	..
400	300	..	33.2	..	3 11 0	0 11 0	..
400	..	200	31.8	..	4 1 0	..	1 14 0
..	300	200	29.6	..	2 9 0	..	2 16 0
400	300	200	34.3	..	4 15 0	0 14 0	..

DISCUSSION.

The grower controlling this farm suggested that potash deficiencies might be found to exist on this block, and the experiment was set out to determine the relative value of the three constituent plant foods of a complete mixture. The actual crop increases were—

							Tons Cane per Acre.
Nitrogen	..	..	..	..	..	..	4.7
Phosphoric acid	..	..	..	..	..	..	2.5
Potash	..	..	..	..	..	..	1.1

It would appear that the farmer's suspicions were groundless, for the greatest increase was recorded with sulphate of ammonia, followed by super-phosphate, with potash of minor importance. The result is actually in agreement with the ratooning performance of all alluvial country of this nature. Due to the heavy applications of phosphate and potash which were unprofitable, the profit from the complete mixture was slight. A suitable mixture for this land is Sugar Bureau No. 1, applied at the rate of 3 to 4 cwt. per acre, and followed by from 1 to 2 bags of sulphate of ammonia in the form of top-dressing. Older ratoons will require heavy applications of nitrogenous fertilizers, and green manuring will be found an excellent practice. The crop yield from this block was seriously reduced by the abnormal degree of flooding experienced.

Messrs. Lyons Bros.' Farm, Redlynch.

Soil Type.—Stoney schist (hill-side) loam.

Nature of Crop.—Plant Cane.

Variety.—S.J. 4.

Age of Crop.—13 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Extra Fertilizer over NF.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
240	360	..	38.8	Average—11.9	2 15 0	..	..
240	..	180	38.0		2 19 0	..	0 19 0
..	360	180	36.4		2 8 0	..	2 12 0
240	360	180	38.4		3 16 0	..	1 8 0
480	360	180	38.3		5 4 0	..	2 18 0

DISCUSSION.

The cane on this block was favoured by adequate soil moisture throughout the spring and made rapid progress. The crop was badly lodged by harvest time, and slight grub damage (which was widespread in the area during the past season) doubtless was responsible for the erratic nature of the yields from the several treatments. It will be observed that this trial contains no plots receiving "no manure." The conclusion to be drawn is that any benefits to the crop were the result of the 240 lb. of sulphate of ammonia and 360 lb. superphosphate, with little, if any, benefit from potash. It certainly appears as though sulphate of ammonia exerted the dominating influence—the usual experience with red schist soils.

Messrs. S. J. Page and Son's Farm, Edmonton.**Soil Type.**—Schist soil.**Nature of Crop.**—First Ratoon.**Variety.**—Pompey.**Age of Crop.**—13 months.**RESULTS.**

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia.	Super-phosphate.	Muriate of Potash.	Cane per Acre.	G.C.S. in Cane.		Profit	Loss.
(N)	(P)	(K)					
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	13.4	Average—14.2	..	..	..
420	270	..	22.6		3 11 0	8 9 0	..
420	..	150	26.8		3 18 0	13 8 0	..
..	270	150	17.5		2 0 0	3 11 0	..
420	270	150	29.6		4 9 0	16 8 0	..

DISCUSSION.

The land received a thorough preparatory treatment while it was in fallow; it was limed, the ratoon trash was ploughed under, and a heavy crop of beans grown as green manure prior to planting the cane. The result was a very favourable plant crop, on which a substantial increase from potash was recorded. The fertilizer treatments were repeated for the ratoons, when a crop increase of over 16 tons per acre followed. It is interesting to compare the relative increases in yield effected by the constituent plant food materials—

Due to—								Plant Cane.	First Ratoons.
								Tons.	Tons.
Nitrogen	..	..	..	..	..	..	..	2.2	12.1
Phosphoric acid	..	..	..	..	..	..	..	2.6	2.8
Potash	..	..	..	..	..	..	..	6.7	7.0

The crop increases for potash and phosphate were substantially identical for both crops, but whereas little increase was experienced with sulphate of ammonia on the plant cane, the influence of this manure on the ratoons is most striking. Two main conclusions may be drawn from these results—

(1) A good crop of legumes ploughed into the soil while in fallow, removes the necessity for heavy applications of sulphate of ammonia on the following plant crop of cane.

(2) The influence of the legumes has almost entirely disappeared by the time the ratoon crop is started, and with soils deficient in available nitrogen, full heavy applications of sulphate of ammonia are necessary.

The yields for the manured and non-manured plots of this trial afford an interesting comparison—

	Plant Cane.	First Ratoons.
	Tons.	Tons.
Complete fertilizer plots	37.0	29.6
" No fertilizer " plots	28.2	13.4

It is observed that the manured crops have been consistently satisfactory, while the ratoons on the unfertilized plots were practically a failure.

A suitable manurial mixture for land of this nature would be Sugar Bureau No. 3, for both plant and ratoon crops, applied at the rate of 4 cwt. per acre; subsequent top-dressings of sulphate of ammonia should be made to supply 3 cwt. per acre to the plant cane and 4 cwt. to ratoons.

W. W. Chapman's Farm, Hambledon.

Soil Type.—Red schist soil on gentle slope.

Nature of Crop.—Plant Cane.

Variety.—Badila.

Age of Crop.—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Extra Nitrogen over 120.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	G.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
120	300	180	22.4	Average—16.4	3 0 0	..	..
240	300	180	23.0		3 14 0	0 6 0	..
360	300	180	25.3		4 8 0	3 5 0	..
480	300	180	25.5		5 2 0	2 13 0	..
600	300	180	27.1		5 16 0	4 15 0	..

DISCUSSION.

Previous trials conducted on this farm exhibited a tremendous increase in yields due to sulphate of ammonia. An attempt was therefore made in the present experiment to determine the most profitable dressing of this manure. All plots received equal amounts of phosphate and potash in the form of planting mixture, and only the nitrogen dressing was varied. The results show progressive improvement up to the 600 lb. application of sulphate of ammonia, and the total increase over the 120 lb. dressing was 4.7 tons of cane per acre. This result confirms our previous findings on the old red schist soils. They respond well to any treatment supplying available nitrogen,

and green manuring is to be highly recommended. On the basis of results to date, 3 cwt. per acre Sugar Bureau No. 2 fertilizer may be employed as a generally satisfactory planting or ratooning mixture, followed by 2 to 3 bags of sulphate of ammonia per acre, as top-dressing, in two applications.

It is interesting to record that these plots were checked by an infestation of grubs, and when conditions were suitable the officers of the Meringa Entomological Station fumigated the area. By this time the cane had received a substantial growth check, but the crop was green when harvested in July, and the C.C.S. value was very satisfactory.

B. Murray's Farm, Gordonvale.

Soil Type.—Schist loam.

Nature of Crop.—Plant Cane.

Variety.—Badila.

Age of Crop.—13 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia.	Super-phosphate.	Muriate of Potash.	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
(N)	(P)	(K)					
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	22.5	16.7	..	..	..
300	300	..	29.1	16.8	2 19 0	8 7 0	..
300	..	180	30.5	16.7	3 7 0	9 16 0	..
..	300	180	22.8	16.4	2 6 0	..	2 17 0
300	300	180	30.4	17.1	4 1 0	10 18 0	..

DISCUSSION.

The cane germinated well, and stooled very satisfactorily. Quite early in the growth of the crop it was evident that the soil was suffering from lack of available nitrogen, as the cane on those plots which received no sulphate of ammonia showed premature yellowing and lack of vigour. This is substantiated by the following summary of the relative increases in yield due to the individual plant foods—

							Tons Cane per Acre.
Nitrogen	..	..	..	..	..	..	7.6
Phosphoric acid	..	..	..	..	..	..	nil
Potash	..	..	..	..	..	..	1.2

Again we have evidence of the absolute necessity for heavy applications of sulphate of ammonia on the schist soils. Sugar Bureau No. 2 mixture should be satisfactory as a general fertilizer, applied at the rate of 3 cwt. per acre. Subsequent top-dressings of sulphate of ammonia should be given to the extent of 3 cwt. per acre on the plant crop or 4 cwt. per acre on ratoons.

R. Hansen's Farm, Highleigh, Gordonvale.

Soil Type.—Old alluvial loam. **Nature of Crop.**—Plant Cane.

Variety.—S.J. 4.

Age of Crop.—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Extra Fertilizer over N.K.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
225	..	150	32.5	} Average—13.8	2 15 0	..	..
225	225	150	32.4		3 4 0	..	0 11 0
450	225	150	33.4		4 10 0	..	0 13 0
225	450	150	33.4		3 14 0	..	0 7 0
450	450	150	33.0		5 0 0	..	1 13 0

DISCUSSION.

The crop made good growth in its young stages and was so well advanced early in 1934 that it was blown over. Subsequently it suffered damage from grubs, and due to the tangled nature of the crop it was not possible for our entomological staff to fumigate efficiently, therefore only one side of each stool was treated. Owing to an accidental fire the cane had to be harvested early in the crushing season, when it was quite immature.

The response to fertilizer has been insignificant, and all fertilizer mixtures recorded a slight loss over the initial treatment of 225 lb. sulphate of ammonia and 150 lb. of potash. Some benefits were probably derived from this application, but the experiment was not designed to allow us to gauge this increase.

Walker Estate, Meerawa.

Soil Type.—Alluvial clay loam. **Nature of Crop.**—Plant Cane.

Variety.—Badila.

Age of Crop.—14 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Extra Fertilizer over K.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	180	33.9	15.9	1 12 0	..	..
216	216	180	33.7	15.6	3 6 0	3 18 0	..
216	432	180	33.9	15.5	3 16 0	3 2 0	..
432	216	180	33.5	15.8	4 12 0	3 9 0	..
432	432	180	37.9	15.1	5 1 0	1 18 0	..

DISCUSSION.

An attempt was made on this block to determine the most economical dressings of sulphate of ammonia and superphosphate. The soil is very similar to that of the South Johnstone Station, where pronounced benefits have been recorded from these manures. It will be observed from the above results that the application of 216 lb. sulphate of ammonia and 216 lb. superphosphate has produced a definite increase in crop yield (almost 5 tons per acre), but heavier applications of these manures have given no further benefits.

Prior to planting, the land received $1\frac{1}{2}$ tons of burnt lime per acre, and a fair crop of beans was also turned under. This would remove the necessity for excessive amounts of sulphate of ammonia on the plant cane, but it is surprising that further increases were not recorded with the double dressing of superphosphate. The excessively wet conditions experienced were certainly not favourable to this class of land.

On soils of this nature, Sugar Bureau No. 1 mixtures are usually satisfactory, applied at the rate of 4-5 cwt. per acre, and followed by top-dressings of sulphate of ammonia to supply 2-3 cwt. per acre for plant cane and 3-4 cwt. for ratoons.

C. T. Neilsen's Farm, Bellenden Ker, Babinda.**Soil Type.**—Alluvial loam.**Nature of Crop.**—Plant Cane.**Variety.**—Badila.**Age of Crop.**—13 months.**RESULTS.**

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application	Net Return (per acre) from Extra Fertilizer over NK.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
216	..	180	23.7	15.2	2 17 0	..	..
216	216	180	23.7	14.9	3 6 0	..	1 10 0
216	432	180	24.8	14.8	3 16 0	..	0 18 0
432	216	180	25.3	14.9	4 12 0	..	0 13 0
432	432	180	24.9	14.8	5 1 0	..	2 0 0

DISCUSSION.

This experiment was designed to show the benefits of light and heavy applications of sulphate of ammonia and superphosphate. The soil is similar in many respects to that of the South Johnstone Station. The anticipated crop increases were not realised, and the initial treatment of sulphate of ammonia and potash was almost equal in value to the heavier fertilizer dressings.

There are undoubtedly good reasons for this lack of response. The cane was planted in August, and the heavy rainfall conditions throughout the growing period adversely affected the crop. This condition was largely responsible for the extraordinary check which all canes in the Babinda area experienced during the past year, and resulted in a crop for the district which was just 50 per cent. of the 1933 tonnage.

It is hoped that the first ratoon crop will be afforded an opportunity of demonstrating the value of the several treatments employed.

H. J. Thomas's Farm, Bartle Frere, Babinda.

Soil Type.—Red volcanic loam. **Nature of Crop.**—Second Ratoon.

Variety.—Badila.

Age of Crop.—11 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Extra Potash over 1K.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
300	300	100	21.7	13.6	3 10 0	..	..
300	300	200	22.8	14.3	4 2 0	3 4 0	..
300	300	300	23.2	14.4	4 14 0	3 9 0	..
300	300	400	24.4	14.2	5 7 0	3 13 0	..
300	300	500	24.6	14.6	5 19 0	4 15 0	..

DISCUSSION.

The crop yields reported above are the third series recorded on this experimental area. The object of the experiment is—(a) To determine the most economical application of potash on the red volcanic loam which is notably deficient in this plantfood, and (b) to determine the influence of heavy potash applications on the C.C.S. of the crop.

The yields for the three crops harvested to date are as follows:—

Potash per Acre.	PLANT CANE.		FIRST RATOONS.		SECOND RATOONS.	
	Cane.	C.C.S.	Cane.	C.C.S.	Cane.	C.C.S.
Lb.	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.
0	27.7	13.9	..	..	..	..
100	31.5	..	28.8	13.5	21.7	13.6
200	33.4	..	32.4	..	22.8	..
300	34.5	..	34.8	..	23.2	..
400	35.5	14.1	35.6	..	24.4	..
500 .. ..	..	..	37.2	13.7	24.6	14.6

It will be noted that the second ratoon yields are substantially lower than those of the preceding crops. Though the cane did not suffer from the excessive wet conditions to the same extent as that on the lowlands, growing conditions were far from satisfactory. The increases from heavy applications of potash were not sustained, and were only a small fraction of those of the previous year. Nevertheless, the treatments were highly profitable, due

largely to the distinctly improved C.C.S. returns obtained. On the preceding crops a small though definite influence could be traced to the potash applications; but with the second ratoons, the application of 500 lb. per acre produced a C.C.S. value a full unit higher than that obtained with the 100 lb. treatment. These results are most encouraging and strongly suggest the probability that continued heavy potash dressings will effect a permanent improvement in the C.C.S. values of canes from these soils.

The recommended treatment for red volcanic loams in the heavy rainfall areas is Sugar Bureau No. 3 mixture applied at the rate of 5 cwt. per acre, followed by top-dressings of sulphate of ammonia. For plant cane, 2-3 cwt. per acre of the latter should suffice, while ratoons would profit from heavier applications.

J. Juhas's Farm, South Johnstone.

Soil Type.—Mixed schist and volcanic loam. **Nature of Crop.**—First Ratoon.

Variety.—Badila.

Age of Crop.—13 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	19.6	16.7	..	..	..
240	240	125	28.0	16.7	3 4 0	7 7 0	..
240	480	125	27.4	16.5	3 16 0	8 5 0	..
240	240	250	27.9	16.9	4 0 0	10 10 0	..
240	480	250	28.5	17.0	4 11 0	11 11 0	..

DISCUSSION.

With the exception of the plots which received no fertilizer, all received a uniform light application of sulphate of ammonia, and the experiment was designed to show the value of light and heavy dressings of super and potash. On the plant crop, the fully-fertilized plots outyielded the "no manure" plots by 10.5 tons per acre, while in the ratoons (recorded above) the increase was 8.9 tons. The response to the double amount of potash was again the most notable feature, and a suitable mixture for this soil type should be rich in this plantfood. This is also confirmed by the higher C.C.S. value which was obtained with heavy potash applications—a most usual experience on potash-deficient lands (see also p. 74).

Sugar Bureau No. 3 mixture should prove a suitable fertilizer when applied at the rate of 5 cwt. per acre. The customary top-dressing of sulphate of ammonia should follow—allowing 2 to 3 cwt. for the plant crop, and 3 to 4 cwt. per acre for the ratoons.

A. G. Newman's Farm, South Johnstone.

Soil Type.—Probably mixed volcanic and schist loam. **Nature of Crop.**—First Ratoon.

Variety.—Badila.

Age of Crop.—16 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertiliser and Application.	Net Return (per acre) from Fertiliser.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	25.7	15.8	..	..	..
240	240	125	31.9	14.6	3 4 0	0 8 0	..
240	480	125	31.8	15.2	3 16 0	2 11 0	..
240	240	250	34.4	15.0	4 0 0	5 0 0	..
240	480	250	34.5	14.7	4 11 0	3 0 0	..

DISCUSSION.

The results of this trial should be studied in conjunction with those on the previous page (J. Juhas's farm). The treatments were identical for the two experiments, and the responses do not differ in any marked degree. The increased yield for the heaviest fertilizer application over the unfertilized plots was 14.1 tons for the plant cane and 8.8 tons for first ratoons.

Although a definite increase from the double super application was obtained on the plant cane, this was not experienced with the ratoons, and only the double potash showed an increase over the single application. Little influence on C.C.S. was recorded, however. This may have been influenced by the fact that the second season's growth was evident before the crop was harvested.

The treatment recommended for this soil type is identical with that for the trial on J. Juhas's farm (see p. 75).

H. M. Smith's Farm, Mundoo, Innisfail.

Soil Type.—Mixed origin (pre- Nature of Crop.—First Ratoon.
dominantly old acid allu-
vial).

Variety.—Pompey.

Age of Crop.—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Extra Fertilizer over NP	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
300	300	..	11.3	..	2 19 0	..	..
300	300	240	19.5	..	4 8 0	10 3 0	..
300	600	240	21.6	..	5 2 0	12 5 0	..
300	300	480	22.3	..	5 18 0	12 7 0	..
300	600	480	22.9	..	6 12 0	12 9 0	..

DISCUSSION.

This trial was located on an area of highly-leached acid soil. Liming and green manuring were carried out while the land was in fallow, and extraordinary crop increases were recorded with fertilizer on the plant cane; the plantfood in greatest demand was potash. In order to avoid a crop failure in the ratoons of the unfertilized plots, the various treatments were modified, so that the original "check" treatments were replaced by a mixture of sulphate of ammonia and superphosphate. Though these plantfoods were doubtless beneficial, the yield was almost exactly one-half of that from the plots receiving the full application of 1,380 lb. per acre of a "complete" mixture. The following are the figures recorded for the lowest and highest yields for plant and ratoon crops:—

	Plant Cane.	First Ratoons.
	Tons.	Tons.
Lowest yielding treatment	24.3	11.3
Highest yielding treatment	41.8	22.9
Gain for full fertilizer	17.5	11.6

The well-nourished ratoons provided a satisfactory crop, while those which were indifferently manured were practically a failure.

The returns from this trial show very clearly that the poor Mundoo soils owe their lack of productivity to acidity and plantfood deficiency; and when these factors are corrected by liming and heavy fertilizer applications, highly satisfactory yields will follow. On this particular class of land, Sugar Bureau

No. 3 mixture is recommended; it should be applied at the rate of 6 to 8 cwt. per acre to plant or ratoons, and followed by top-dressings of sulphate of ammonia to give 2 to 3 cwt. per acre for plant cane, and 3 cwt. for ratoons. The expense of sulphate of ammonia could be avoided on the plant crop if green manuring be practised.

H. Spencer's Farm, Feluga, Tully.

Soil Type.—Gravelly loam (granitic). **Nature of Crop.**—Third Ratoon.

Variety.—Badila.

Age of Crop.—13 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Extra Fertilizer over 1K.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	100	21.6	16.5	1 2 0	..	..
250	200	100	26.0	15.5	3 1 0	1 4 0	..
250	400	100	26.7	16.0	3 10 0	3 17 0	..
500	200	100	26.9	16.1	4 10 0	3 11 0	..
500	400	100	26.7	16.0	4 19 0	2 8 0	..

DISCUSSION.

This trial was located on the typical gravelly loam soil of the area. This type is notably deficient in humus—and hence, available nitrogen—and it was suspected that phosphates would produce increased yields as the land aged. The results of the first and second ratoon crops bore out this contention, but those for the third ratoons (recorded above) are not in conformity. Doubtless, phosphates played a part in increasing the yield by 5 tons per acre over the "no manure" plots; but the double applications of both phosphate and nitrogen were of no avail. The fact that the crop had lodged badly before maturing may have influenced this result. The yields of fully fertilized and "no manure" plots for the three crops were as follows:—

	First Ratoons.	Second Ratoons.	Third Ratoons.
	Tons.	Tons.	Tons.
"Full fertilizer" plots	43.1	36.5	26.7
"No manure" plots	36.8	27.8	21.6
Increase due to fertilizer	6.3	8.7	5.1

Sugar Bureau No. 1 mixtures at the rate of 4 cwt. per acre are suited to this soil type, and these should be followed by substantial applications of sulphate of ammonia—3 cwt. per acre for plant cane and 4 cwt. for ratoons.

T. Jones's Farm, Feluga, Tully.

Soil Type.—Gravelly loam (granitic). **Nature of Crop.**—First Ratoon.

Variety.—Badila.

Age of Crop.—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Extra Fertilizer over P.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	400	..	31.6	14.1	1 9 0	..	..
250	400	150	36.3	14.3	3 16 0	5 12 0	..
250	400	300	35.6	13.7	4 15 0	..	0 12 0
500	400	150	35.8	14.2	5 5 0	2 0 0	..
500	400	300	36.4	14.0	6 4 0	0 14 0	..

DISCUSSION.

The object of this experiment was to determine the value of nitrogen and potash on the gravelly loam. At times, results obtained on this soil type have suggested potash deficiency, while sulphate of ammonia may be expected to give good results always. The returns recorded above show that the single applications of sulphate of ammonia and potash (in addition to the uniform application of super on all plots) produced further 4.7 tons of cane per acre, but the extra amounts had no influence on yield. The C.C.S. returns appear anomalous in that the lower values were recorded with the heavier potash dressings.

The cane on the most advanced plots lodged badly long before harvest, and the yields actually were lighter than on certain plots which carried less forward crops. Doubtless this factor has led to anomalous returns for both yield and C.C.S. values. It is hoped that the second ratoon crop will yield more consistent values.

At the present juncture the suggested treatments already given (p. 78) for this soil type are recommended as suitable.

BURDEKIN DISTRICT.

The results of the six trials harvested in this area during the past season are again very interesting, and they add to our knowledge of the plant food requirements of the cane lands of the district. For the first time a trial was harvested under typical Giru irrigated conditions. It is interesting to note, also, that the results from this experiment are in complete accord with those from the Ayr and Home Hill lands; the only plant food to give a definite crop increase was nitrogen (sulphate of ammonia).

The present series of trials embraced only plant crops, so that the conclusions will not be applicable to ratoons. In the aggregate it would appear that sulphate of ammonia applications on plant cane should not exceed 3 cwt. per acre, except in special cases. It should be pointed out that the majority of the present trials were located on better class soils, or on lands which have been given some special preparatory treatment; these factors will be emphasised where necessary when the individual trials are discussed.

In the light of our experiences to date and having regard for the fact that ratooning is still far from being a common practice, green manure while the land is in fallow cannot be too strongly recommended. In addition to other benefits which the practice confers on the land the wealth of available nitrogen which is added to the soil will effect a substantial reduction in the sulphate of ammonia bill.

As a general fertilizer treatment the application of 3 cwt. per acre of mixed manure, such as Sugar Bureau No. 1, either as a planting or ratooning dressing, is to be recommended, in addition to the nitrogenous manure. It will ensure a rapid strike, make for rapid early crop growth, and help maintain the plant food supply of the land.

The average yields of "no nitrogen" and fully manured plots on the six trials in this area were:

	Tons.					
Complete mixture	50.1
No nitrogen	43.8
						<hr/>
Increase for nitrogen	6.3

Substantial improvement in these crop increases may be looked for in the ratoons, when the heavier application of sulphate of ammonia are expected to exert their full influence.

Messrs. Grigg Bros.' Farm, Giru.

Soil Type.—Alluvial clayey loam. **Nature of Crop.**—Plant Cane.

Variety.—Clark's Seedling.

Age of Crop.—14 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	35.0	17.2	..	..	..
360	300	..	44.6	16.2	3 4 0	6 10 0	..
360	..	150	41.4	16.7	3 9 0	4 6 0	..
..	300	150	35.6	17.2	2 3 0	..	1 2 0
360	300	150	41.9	16.4	4 3 0	2 11 0	..

DISCUSSION.

This trial—the first to be harvested by the Bureau in the Invicta area—is of the standard preliminary type, in that it was designed to give information on the relative value of the individual plant food constituents of mixed fertilizer. As was anticipated, the mixture which contained no sulphate of ammonia was without influence on the yield, while the direct benefits from superphosphate and potash are doubtful. Sulphate of ammonia has resulted in an increased yield of over 6 tons of cane per acre; and although the c.c.s. suffered an appreciable reduction due to this manure, worthwhile financial benefits were experienced.

This depressing influence of the sulphate of ammonia is possibly associated to some extent with the fact that the plots carrying the heaviest crops had much fallen cane. All of these had been treated with sulphate of ammonia.

Although the evidence to date is all too inadequate to permit of specific recommendations, it is felt that the advice presented in the general review of the Burdekin plots (p. 80) may be followed with safety.

E. W. Lewty's Farm, Dick's Bank, Brandon.

Soil Type.—Alluvial loam.

Nature of Crop.—Plant Cane.

Variety.—Korpi.

Age of Crop.—17 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertiliser and Application.	Net Return (per acre) from extra Fertilizer over P.K.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	240	120	31.4	17.1	1 16 0	..	..
240	240	120	42.7	17.2	3 4 0	18 11 0	..
360	240	120	45.8	16.9	3 18 0	20 19 0	..
480	240	120	46.3	16.9	4 12 0	21 1 0	..
600	240	120	46.5	16.8	5 6 0	20 0 0	..

DISCUSSION.

All plots in this trial received uniform applications of superphosphate and potash; the quantity of sulphate of ammonia applied was therefore the only variable. This old land is living up to its reputation for nitrogen deficiency, and extraordinary crop increases were recorded even with light dressings of ammonia. The increased yields for successive amounts of this manure were as follows:—

Quantity of sulphate of ammonia per acre.

Lb.

240

360

480

600

Crop increase.

Tons.

11.3

14.4

14.9

15.1

The entire crop was erect at harvest time, and the reduction in c.c.s. where heavy dressings were applied was slight.

The value of green manuring on this land, while in fallow, cannot be over-emphasised.

Messrs. Hoey Bros.' Farm, Brandon.**Soil Type.**—Alluvial loam.**Nature of Crop.**—Plant Cane.**Variety.**—Oramboos.**Age of Crop.**—15 months.**RESULTS.**

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Extra Fertilizer over P.K.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	240	120	43.4	14.6	1 16 0	..	..
240	240	120	45.7	14.8	3 4 0	3 11 0	..
360	240	120	46.4	14.8	3 18 0	3 6 0	..
480	240	120	46.2	14.6	4 12 0	0 19 0	..
600	240	120	47.6	14.7	5 6 0	2 16 0	..

DISCUSSION.

The block in which this trial was located had been given a uniform application of molasses at the rate of 10 tons per acre during the fallow. The nitrogen added in this way would approximate in value to that supplied by 1,000 lb. of sulphate of ammonia. The value of this by-product as a rejuvenator of old lands in this area is thus evident.

Despite this treatment the sulphate of ammonia added in the experiment was responsible for a further definite yield increase, and all treatments were profitable.

The variety planted in this trial (Oramboos) is not one which can be expected to produce very heavy crop yields, though it possesses other favourable characteristics. Cane on many of the plots had lodged prior to harvesting, and a substantial quantity of dead cane was left in the field.

This block has been ratooned, and further interesting results may be anticipated in 1935.

J. Ahern's Farm, Airdale, Ayr.

Soil Type.—Alluvial loam.

Nature of Crop.—Plant Cane.

Variety.—Oramboo.

Age of Crop.—17 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from extra Fertilizer over P.K.	
Sulphate of Ammonia (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	240	120	44.9	Average—14.7	1 16 0	..	..
180	240	120	45.7		2 17 0	..	..
360	240	120	47.7		3 18 0	1 13 0	..
540	240	120	46.5		4 19 0	..	1 0 0
720	240	120	46.7		6 0 0	..	1 16 0

DISCUSSION.

On this trial an attempt was made to determine the influence of excessive amounts of sulphate of ammonia on crop yields and c.c.s. returns. The variety employed (Oramboo) was scarcely suitable for this purpose, and when the crop was harvested, much fallen and dead cane was found on the plots. Much of this may have been avoided had the crop been harvested earlier, but this course was not convenient.

The apparently slight increases in crop yield are therefore misleading, but it may be safely assumed that little benefit is to be expected from applications in excess of 360 lb. per acre. It will be remembered that this conclusion is drawn in respect of the plant crop; it remains to be seen how the ratoons will respond.

J. Casalegno's Farm, Jarvisfield, Ayr.

Soil Type.—Alluvial loam.

Nature of Crop.—Plant Cane.

Variety.—Badila.

Age of Crop.—14 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from extra Fertilizer over P.K.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.G.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	240	120	47.6	..	1 16 0	..	..
120	240	120	51.5	..	2 10 0	5 0 0	..
240	240	120	51.7	..	3 4 0	4 12 0	..
360	240	120	50.8	..	3 18 0	2 12 0	..
480	240	120	51.7	..	4 12 0	3 4 0	..

DISCUSSION.

This trial was uniform with the others harvested in the Ayr district in that it aimed at a determination of the most profitable application of sulphate of ammonia for plant cane. The experiment was marred to some extent by the inclusion of an area of new ground in one row of plots; on this portion the crop yields average about 67 tons per acre.

The light applications of sulphate of ammonia appear to have exerted a definite influence on yields, though little benefit was experienced with dressings in excess of 120 lb. per acre. The ratoon yields should therefore be most interesting.

R. D. Low's Farm, Jarvisfield, Ayr.

Soil Type.—Alluvial clayey loam. **Nature of Crop.**—Plant Cane.

Variety.—Badila.

Age of Crop.—15 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Extra Fertilizer over P.K.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	240	120	60.3	13.4	1 16 0	..	..
120	240	120	61.8	13.9	2 10 0	5 13 0	..
240	240	120	65.3	13.7	3 4 0	7 4 0	..
360	240	120	63.9	13.8	3 18 0	5 17 0	..
480	240	120	66.0	13.1	4 12 0	0 15 0	..

DISCUSSION.

This experiment was set out on an area of the newer alluvial land adjacent to the Burdekin River. This area has always produced heavy crops where adequate irrigation water was applied; the cane is afflicted with the usual consequence of excessive fertility in that high c.c.s. value cannot be obtained.

Though the yields from the increasingly heavy applications of nitrogen must not be regarded too seriously on account of their erratic nature, it does appear that the sulphate of ammonia conferred some benefit on the crop. The fact that the "no nitrogen" plot gave a lower c.c.s. return than three of the plots receiving sulphate of ammonia, suggests that the crop was overmature when harvested.

These plots have been ratooned, and results of value may be expected therefrom in 1935.

MACKAY DISTRICT.

Growing conditions in the Mackay area during the past season were generally favourable, with the result that crop yields were above the average. Nevertheless, all crops did not respond equally.

Early planted cane was particularly favoured, and such crops gave generally satisfactory yields. Late planted cane and ratoons frequently suffered from excessively wet conditions before the crop was established, while many of the ratoon blocks had received harsh treatment due to bogging of wagons and the trampling of animals when the ground was over-wet. Six of the nine trials herewith reported relate to ratoon blocks, and this is reflected in the following average yields for manured and unmanured plots:—

	Tons per acre						
" Complete fertilizer " plots	19.8
" No fertilizer " plots	14.0
							—
Increase due to fertilizer	5.8
							—

The average crop increase must be regarded as satisfactory in the circumstances. With the succession of favourable years, which is now being experienced in this area, the improved crop yields are making heavy demands on the fertility of the land, and greater attention must be paid to the plant food supply of the soil if favourable yields are to be maintained.

There is another aspect to the problem of rejuvenating the old soils of the area which is affected by these conditions also; it is rightly claimed that in unfavourable seasons green manure crops are frequently a failure, while the light cane yields do not permit of trash conservation methods. The grower should, therefore, give careful consideration to the following chain of causes and effects and take advantage of the opportunity offered:— Favourable rainfalls mean good response to fertilizers and profitable returns; bigger crops may be harvested in the leaf at standard cutting rates, and the trash conserved is a surface mulch to be turned into the land when the ratoon stubble is ploughed out. Trash plus green manure means improved soil fertility, which gives better crops under favourable or unfavourable years, and permits of a continuance of these operations which are essential to a system of permanent agriculture—at least in these parts.

Growers are urged to study the returns which follow, in relationship to their individual conditions. The results of value are those from trials on soil types similar to their own.

A. Garnham's Farm, Mount Martin, via Mirani.**Soil Type.**—Sandy loam.**Nature of Crop.**—Plant Cane.**Variety.**—Q. 813.**Age of Crop.**—14 months.**RESULTS.**

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	16.6	Average—15.3	..	..	..
195	325	..	17.0		2 16 0	..	2 5 0
195	..	130	18.4		2 8 0	0 3 0	..
..	325	130	18.0		1 19 0	0 1 0	..
195	325	130	20.1		3 1 0	1 19 0	..

DISCUSSION.

Excessive rains seriously retarded cultivation in this block, and stooling of the cane suffered as a consequence. Nevertheless, distinct response to manure was recorded, though the financial benefits were slight. On the results obtained it would be unwise to draw conclusions.

Messrs. Tyler and Son's Farm, Orkatie, N.C. Line.**Soil Type.**—Forest sandy loam.**Nature of Crop.**—Plant Cane.**Variety.**—M. 1900.**Age of Crop.**—17 months.**RESULTS.**

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	20.6	17.8	..	..	..
324	324	..	23.3	17.4	3 0 0	0 10 0	..
324	..	120	17.6	17.3	3 1 0	..	9 16 0
..	324	120	21.6	17.0	1 18 0	..	2 13 0
324	324	120	27.4	17.0	3 14 0	5 7 0	..

DISCUSSION.

The plots receiving sulphate of ammonia and potash were handicapped by the excessively wet conditions which were experienced, and the return for this mixture is therefore not to be regarded as a correct value.

However, the value of the complete manure appears to be quite definite. On the basis of previous experiments on the forest sandy loams of the Mackay area it may be assumed that a phosphate-rich complete fertilizer should be applied to all crops as an initial dressing. Sugar Bureau No. 1 mixture would be suitable for this purpose. Subsequently sulphate of ammonia should be used as top-dressing at the rate of 2 cwt. per acre for plant cane and 3 cwt. for ratoons.

H. Webster's Farm, Owen's Creek, via Mackay.

Soil Type.—Alluvial loam (creek flat). **Nature of Crop.**—First Ratoon.

Variety.—Badila.

Age of Crop.—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia.	Super-phosphate.	Muriate of Potash.	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
(N)	(P)	(K)					
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	10.8	Average—15.5	..	..	..
360	360	..	14.4		3 5 0	2 13 0	..
360	..	180	12.6		3 11 0	..	0 14 0
..	360	180	15.3		2 6 0	5 3 0	..
360	360	180	16.9		4 6 0	5 9 0	..

DISCUSSION.

This trial was commenced on a first ratoon block, and the relative crop increases due to the individual plant foods of the complete mixture were:—

Due to—	Tons.
Nitrogen	1.6
Phosphoric acid	4.3
Potash	2.5

These results are in marked contrast to those from the older soils of the Mackay District, on which the bulk of the crop increase with ratoons is due to sulphate of ammonia.

The need for a phosphate-rich mixture is indicated by these returns (Sugar Bureau No. 1 should be suitable) followed by a modest application of sulphate of ammonia, especially for ratoons.

H. R. Gohdes's Farm, Mackay.

Soil Type.—Deep alluvial loam.

Nature of Crop.—First Ratoon.

Variety.—Clark's Seedling.

Age of Crop.—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	22.7	Average—15.1	..	..	..
300	350	..	26.2		2 18 0	2 0 0	..
300	..	200	29.7		3 7 0	6 9 0	..
..	350	200	19.4		2 9 0	..	7 2 0
300	350	200	25.8		4 2 0	0 5 0	..

DISCUSSION.

Due to irregularities in soil and topography the individual plot yields in the above trial were rather erratic, and this is reflected in the average yields for the several treatments. It is safe to conclude, however, that this particular type gives highly beneficial returns from fertilizers rich in nitrogen; in many respects it is very similar to the Mackay Experiment Station soil, where the response to sulphate of ammonia is distinctly consistent.

A satisfactory fertilizer treatment would be an application of 3 cwt. per acre of Sugar Bureau No. 1 mixture, followed by top dressings of sulphate of ammonia to give 2 cwt. per acre for plant cane, and from 3 to 4 cwt. for ratoons. Second or third ratoons would profit from the full 4 cwt. application of the latter manure.

Messrs. Hill and Son's Farm, Peri.

Soil Type.—Sandy loam.

Nature of Crop.—First Ratoon.

Variety.—M. 1900.

Age of Crop.—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	11.8	16.0	..	..	..
360	300	..	19.3	16.5	3 4 0	10 14 0	..
360	..	120	18.7	15.7	3 6 0	7 6 0	..
..	300	120	11.2	15.4	1 18 0	..	3 0 0
360	300	120	20.0	16.3	3 19 0	10 10 0	..

DISCUSSION.

Despite harvesting difficulties in the previous season, the ratoon yields from this experiment are quite satisfactory. The fully fertilized plots yielded a crop almost double that from the unmanured plots. The comparative increases for plant and ratoon crops were:—

—				Plant Cane.	First Ratoon.
				Tons.	Tons.
"Complete fertilizer" plots	..	..	..	30.2	20.0
"No manure" plots	..	..	..	23.6	11.8
Increase due to fertilizer				6.6	8.2

The benefits of the manure were most striking with the ratoons, and although superphosphate was responsible for the greatest individual effect on the plant cane, sulphate of ammonia dominated the position with the ratoons.

A satisfactory fertilizer treatment for this soil type would consist of an initial dressing of 4 cwt. per acre Sugar Bureau No. 1 mixtures for plant and ratoons respectively, followed by $1\frac{1}{2}$ cwt. sulphate of ammonia on plant cane, and from 2 to 3 cwt. on ratoons.

It should be pointed out that the relative crop increases tabulated in this discussion are not strictly comparable, as the plant cane received only 200 lb. sulphate of ammonia per acre, but this was increased to 360 lb. for the first ratoons.

Messrs. Soper and Son's Farm, Boldon, Mackay.**Soil Type.**—Loam.**Nature of Crop.**—Plant Cane.**Variety.**—M. 1900.**Age of Crop.**—13 months.**RESULTS.**

Fertiliser Applied per Acre			Crop Yields.		Cost of Fertiliser and Application.	Net Return (per acre) from Fertiliser.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	19.6	17.4	..	..	..
240	240	..	24.3	16.8	2 7 0	3 12 0	..
240	..	120	23.9	16.8	2 11 0	2 13 0	..
..	240	120	18.4	17.3	1 14 0	..	4 1 0
240	240	120	23.9	16.9	3 1 0	2 12 0	..

DISCUSSION.

The cane was planted in September, and made very good progress under the conditions obtaining. The results also show very decided benefits from the fertilizers applied; the relative values of the individual plant foods were:—

Due to—							Tons.
Nitrogen	..	..	..	..	..	..	5.5
Phosphoric acid	..	..	..	..	..	..	Nil
Potash	..	..	..	..	..	..	Nil

It is, therefore, surprising to find that the entire crop increase was due to sulphate of ammonia. This is decidedly unusual for plant cane, and it is suggested that further comment should be deferred until the confirmatory results are available for the ratoon crop.

P. E. Nielsen's Farm, Septimus, Mackay.**Soil Type.**—Sandy loam
(stony in places).**Nature of Crop.**—First Ratoon.**Variety.**—E.K. 28.**Age of Crop.**—12 months.**RESULTS.**

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	9.9	16.5	..	..	..
360	240	..	16.2	16.0	3 0 0	7 4 0	..
360	..	150	13.4	15.6	3 8 0	1 6 0	..
..	240	150	12.6	15.7	1 18 0	1 11 0	..
360	240	150	16.7	16.2	3 18 0	7 12 0	..

DISCUSSION.

The plant crop from this trial was retarded by the unduly dry conditions which this locality experienced in the spring of 1932. The ratoons fared somewhat better, as is demonstrated by the fact that the fully-manured yielded a crop almost identical with that of the plant cane. The relative increases for the individual plant foods were:—

Due to—	Tons.
Nitrogen	4.1
Phosphoric acid	3.3
Potash	0.5

Again it must be recorded that nitrogen is the most important plant food for ratoons, though the influence of phosphate was also pronounced. An application of Sugar Bureau No. 1 mixture at the rate of 4 to 5 cwt. per acre should be given early in the lifetime of all crops, followed by top dressing with sulphate of ammonia at the rate of 2 cwt. per acre for plant cane and 3 cwt. for ratoons.

E. O'Brien's Farm, Sunnyside.

Soil Type.—Sandy loam.

Nature of Crop.—First Ratoon.

Variety.—H.Q. 285.

Age of Crop.—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertiliser.	
Sulphate of Ammonia.	Super-phosphate.	Muriate of Potash.	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
(N)	(P)	(K)					
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	7.2	16.6	..	..	..
360	300	..	10.7	16.7	3 4 0	3 0 0	..
360	..	150	10.1	16.7	3 9 0	1 16 0	..
..	300	150	8.4	16.6	2 1 0	..	0 3 0
360	300	150	12.1	16.7	4 2 0	4 13 0	..

DISCUSSION.

Though the ratoons from this trial yielded light crops, the returns from fertilizer are distinctly profitable where suitable mixtures were applied. It may be recalled that the plant crop showed outstanding benefits from super-phosphate; in anticipation of greater benefits from nitrogen to the ratoons, the dressing of sulphate of ammonia was increased from 200 lb. to 360 lb. per acre. The results are in accordance with this anticipation, for the relative increases were as follows:—

Due to—							Tons.
Nitrogen	..	..	..	..	..	..	3.7
Phosphoric acid	..	..	..	..	..	..	2.0
Potash	..	..	..	..	..	..	1.4

The fertilizer treatment as set out on p. 91, following the results of Messrs. Hill and Son's trial, may be regarded as entirely suitable for conditions at Sunnyside.

A. Petersen's Farm, Homebush, Mackay.**Soil Type.**—Sandy loam.**Nature of Crop.**—First Ratoon.**Variety.**—Q. 813.**Age of Crop.**—12 months.**RESULTS.**

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	7.0	15.4	..	..	..
360	300	..	9.6	14.3	3 4 0	..	1 1 0
360	..	150	11.0	14.6	3 9 0	1 7 0	..
..	300	150	7.1	14.4	2 1 0	..	3 0 0
360	300	150	11.6	14.9	4 2 0	1 19 0	..

DISCUSSION.

The weather conditions of the 1933 spring and early summer were distinctly unfavourable for ratoons in this particular area, where land drainage is a difficult problem. As a consequence the crop was practically a failure, and the benefits from fertilizer were minimised. The contrast of the plants and the first ratoon yields is of interest in this respect:

					Plant Crop.	First Ratoon.
					Tons.	Tons.
Fully-fertilized cane	..	..	..	..	37.2	11.6
Unmanured cane	..	..	..	..	31.5	7.0
Increase due to fertilizer					5.7	4.6

The first ratoon results confirm those of the plant crop in that they show the need for nitrogenous manures (relative increase due to nitrogen was 4.5 tons), while potash also appears to be an important constituent of the mixed fertilizer most suitable for these conditions.

The c.c.s. returns appear to support this contention, for, as was pointed out in discussing the plant cane results, the sugar content of the crop was better from those plots receiving potash in addition to sulphate of ammonia.

SOUTHERN DISTRICTS.

The southern cane areas all experienced rainfalls decidedly above the average, and crop yields were influenced accordingly. In the Bundaberg and Childers areas this had the effect of producing the heaviest crops harvested for a number of years, but in the Moreton and southernmost districts excessive rains caused considerable losses from water-logging. All experimental results reported at this time were obtained from trials in the Bundaberg area. Four of the ten were located on Bingera Plantation, under irrigated conditions, and the returns from these experiments should be of interest to those growers interested in irrigation in the Southern districts. They demonstrate conclusively that the lands of this type are capable of producing crops equal to those of any district in Queensland, provided soil moisture and plant food deficiencies are taken care of.

The average yields for fully-manured and unfertilized plots were as follows:—

					Tons.
Fully manured plots	..	..	..	..	40.8
"No manure" plots	..	..	..	..	34.0
Average increase due to fertilizer					6.8

During the extraordinarily dry years which afflicted the area prior to 1933, small crops combined with the absence of excessive leaching of the soil, resulted in an appreciable accumulation of available plant foods which would serve the needs of two or three reasonable crops. Heavy responses from fertilizer cannot, therefore, be expected with normal crops of plant cane. With the exception of those blocks which were irrigated the response on plant cane was slight, but the ratoons have reacted most favourably to the manurial treatment, as is seen from the following comparison:—

					Tons.
Fully fertilized ratoons	..	..	..	..	31.7
Unfertilized ratoons	..	..	..	..	22.1
Increase due to fertilizer					9.6

Included with the fertility trials of this area are the results of further varietal trials which were not available for the October (1934) Quarterly Bulletin. These returns confirm the opinions previously expressed with respect to the value of the new gumming resistant varieties in Southern Queensland.

Bingera Plantation (Mitchell's B.K. 3) Bundaberg.**Soil Type.**—Red volcanic loam.**Nature of Crop.**—Plant Cane.**Variety.**—N.G. 16.**Age of Crop.**—19 months.**RESULTS.**

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	68.8	13.9	..	..	..
400	400	..	77.7	13.6	3 12 0	3 15 0	..
400	..	400	81.4	13.5	5 2 0	5 7 0	..
..	400	400	68.7	14.3	3 14 0	0 12 0	..
400	400	400	80.2	13.6	5 19 0	4 6 0	..

DISCUSSION.

The results of this trial should be of considerable interest to all cane-growers of the Bundaberg area who are so placed that they can take advantage of facilities for irrigation. This particular block is representative of the good-quality red volcanic soil of the district. It was planted in February, and was well established before the winter. During the following growing season it made excellent progress, and when harvested, portions of the block yielded over 80 tons of cane per acre.

The results from the fertilizer treatments in the experiment also demonstrate the necessity for substantial plant food applications if heavy crops are to be harvested. The fact that the unmanured cane yielded 69 tons per acre is a tribute to the sound agricultural system which is consistently pursued by these growers; yet an increase of 12 tons per acre was recorded from the added manure. The value of the individual plant foods was as follows:—

Due to—	Tons per acre.
Nitrogen	11.5
Phosphoric acid	Nil
Potash	2.5

The marked increase due to sulphate of ammonia is consistent with our findings to date on other irrigated farms. The small increase to potash is suggestive of a much greater need for this plant food on successive crops, for the soil is notably deficient in available potash. No response to phosphate was recorded. This is the general experience with the red volcanic loam.

Bingera Plantation (Block 23), Bundaberg.

Soil Type.—Red forest loam.

Nature of Crop.—Plant Cane.

Variety.—Oramboos.

Age of Crop.—17 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from extra Fertilizer over 1K.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.G.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	250	62.3	15.5	2 0 0	..	..
300	300	250	63.1	15.5	4 6 0	..	1 2 0
300	600	250	67.0	15.0	4 19 0	..	1 2 0
600	300	250	68.6	14.6	5 19 0	..	4 0 0
600	600	250	67.6	15.2	6 12 0	0 2 0	..

DISCUSSION.

This trial marks an attempt to determine the value of heavy applications of sulphate of ammonia and superphosphate on the red forest soil. These soils are not especially responsive to potash dressings, as a rule, and all plots were treated uniformly with this plant food.

The variety grown was Oramboos, and the most striking feature of the results is the uniformly heavy tonnages harvested from all plots due to irrigation practice. The yield increases from the several plant food treatments are not outstanding, which again shows the wisdom of the methods of maintaining the fertility of the soil which have been practised on this plantation. The results do suggest, however, that good response to nitrogen and phosphate will be experienced with subsequent ratoons, and comment will be deferred until these returns are to hand. The results of a ratoon trial under similar conditions to these will be found on the next page (p. 99).

Bingera Plantation (Block 30), Bundaberg.**Soil Type.**—Forest loam.**Nature of Crop.**—First Ratoon.**Variety.**—Q. 855.**Age of Crop.**—12 months.**RESULTS.**

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from extra Fertilizer over 1K.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Ton	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	250	31.1	14.9	2 0 0	..	..
300	300	250	34.5	14.6	4 6 0	0 18 0	..
300	600	250	38.9	14.6	4 19 0	6 3 0	..
600	300	250	42.5	14.1	5 19 0	6 15 0	..
600	600	250	39.1	14.2	6 12 0	2 8 0	..

DISCUSSION.

The block in which this trial was located carried a crop of first ratoon Q.855. The trial aimed at a determination of the highest economical dressings of both sulphate of ammonia and superphosphate. Although the plant cane trial (p. 98) on similar soil gave no marked response to the double applications of these plant foods, the present block showed a definite increase for the extra 300 lb. per acre of sulphate of ammonia. This is what would be expected under irrigated conditions. The crop increase due to the additional superphosphate was not significant, and amounted to only 0.5 tons per acre. The following table brings out the comparison:—

— — — — —					Sulphate of Ammonia.	Superphosphate.
					Tons.	Tons.
Single dressing (300 lb.)	..	..	..	..	36.7	38.5
Double dressing (600 lb.)	..	..	..	..	40.8	39.0
Increase for double over single					4.1	0.5

It is probable that successive heavy crops, under irrigation practice, will deplete the plant food supply of the soil to the point where heavy applications of complete manure will be necessary.

Bingera Plantation (Hill End, K.B. 2), Bundaberg.

Soil Type.—Light brown loam (shotty).

Nature of Crop.—Plant Cane.

Variety.—Orambo.

Age of Crop.—17 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from extra Fertilizer over P.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	300	..	37.1	16.2	1 3 0	..	..
300	300	200	41.8	16.1	4 0 0	4 0 0	..
300	300	400	41.8	16.0	5 4 0	2 3 0	..
600	300	200	44.6	15.8	5 14 0	4 10 0	..
600	300	400	45.4	15.7	6 17 0	3 18 0	..

DISCUSSION.

This trial attempted to show the value of light and heavy applications of sulphate of ammonia and potash under irrigation. All plots received a uniform application of superphosphate. The results show a decided benefit from the double application of nitrogen, while no definite increase was recorded for the extra potash. The following are the comparative yields for the respective applications:—

	Sulphate of Ammonia.	Muriate of Potash.
	Tons.	Tons.
Single application	41.8	43.2
Double application	45.0	43.6
Increase—double over single	3.2	0.4

Again the benefits of heavy applications of sulphate of ammonia under irrigated conditions have been demonstrated. Apparently the single (200 lb. per acre) application of muriate of potash has been sufficient for the needs of the plant cane.

Messrs. E. H. and A. Newitt's Farm, Lovers' Walk, Bundaberg.**Soil Type.**—Red sandy loam.**Nature of Crop.**—First Ratoon.**Variety.**—M. 1900.**Age of Crop.**—13 months.**RESULTS.**

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	G.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	15.4	16.2	..	..	..
240	360	..	22.0	15.6	2 12 0	5 16 0	..
240	..	180	20.5	15.4	2 19 0	2 12 0	..
..	360	180	20.2	16.1	2 7 0	4 19 0	..
240	360	180	25.5	15.2	3 14 0	8 7 0	..

DISCUSSION.

The plant crop results from this trial (harvested in 1933) showed a decided increase from superphosphate. The benefits from fertilizer on the first ratoons was even more pronounced, and the yield of the fully fertilized cane actually exceeded that in the plant crop:—

	Plant Cane.	First Ratoons.
	Tons.	Tons.
Complete fertilizer plots	22.2	25.5
"No manure" plots	17.1	15.4
Increase from fertilizer	5.1	10.1

The ratoons showed the absolute need for a complete manure on this soil type. The comparison between the individual responses on plant and ratoon cane is interesting:—

Due to—	Plant Cane.	First Ratoons.
	Tons.	Tons.
Nitrogen	0.2	5.3
Phosphoric acid	3.7	5.0
Potash	1.3	3.5

Again superphosphate was of great value, but the benefits from sulphate of ammonia (nitrogen) are most striking. This confirms the oft-repeated truism regarding the necessity for adequate nitrogenous fertilizer for ratoons.

On the basis of the above results, the following mixture is recommended for this soil type:—A general fertilizer (such as Sugar Bureau No. 2) applied at the rate of 4 cwt. per acre to both plant and ratoon crops, followed by a top dressing of sulphate of ammonia at the rate of $1\frac{1}{2}$ cwt. per acre for plant cane and 3 cwt. for ratoons.

Although the completely manured cane showed a reduction in c.c.s. value due to the nitrogen applied, the profit per acre was £8 7s.

W. Kirby's Farm, Rubyanna, Bundaberg.

Soil Type.—Alluvial sandy loam.

Nature of Crop.—Plant Cane.

Variety.—Q. 813.

Age of Crop.—13 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	39.3	Average 13.5	..	..	..
120	300	..	39.7		1 17 0	..	1 8 0
120	..	120	39.1		1 19 0	..	1 14 0
..	300	120	40.5		1 17 0	..	0 9 0
120	300	120	39.4		2 11 0	..	1 19 0

DISCUSSION.

The cane in this trial made excellent progress under the favourable growing conditions experienced until the cyclonic wind in March flattened that portion of the block which was most advanced. Doubtless this interfered very seriously with the results from the several treatments, and at harvest time highly erratic returns were obtained.

On this class of country decided benefits are obtained with nitrogenous manures, particularly on ratoon crops.

F. E. G. Samuels' Farm, South Kalkie, Bundaberg.

Soil Type.—Yellow forest loam.

Nature of Crop.—Plant Cane.

Variety.—M. 1900.

Age of Crop.—14 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	22.6	16.2	..	..	..
200	300	..	22.4	15.8	2 5 0	..	3 10 0
200	..	120	22.8	15.9	2 7 0	..	3 3 0
..	300	120	22.9	16.1	1 17 0	..	1 14 0
200	300	120	23.5	15.6	3 0 0	..	3 16 0

DISCUSSION.

This grower had recently installed his irrigation plant, and it was hoped that a fertilizer trial such as the above would guide him in his fertilizer practice under irrigated conditions. Unfortunately, the modest crop which resulted showed no benefits from any of the plant foods applied. It was found that slight irregularities in the land surface made it rather difficult to apply the water evenly, and when this obstacle has been overcome much larger crops and more marked increases from manures will be experienced.

E. A. (late H. C.) Pressler's Farm, Kalkie, Bundaberg.**Soil Type.**—Red volcanic loam. **Nature of Crop.**—Second Ratoon.**Variety.**—M. 1900.**Age of Crop.**—12 months.**RESULTS.**

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	18.9	16.4	..	..	..
240	240	..	24.7	16.1	2 7 0	5 18 0	..
240	..	180	27.7	16.2	2 19 0	10 9 0	..
..	240	180	21.0	16.4	2 2 0	1 6 0	..
240	240	180	27.6	16.2	3 9 0	8 5 0	..

DISCUSSION.

This trial was set out in 1931, and due to the droughty conditions experienced the crop was not fit to harvest as a trial. The following year no further fertilizer was applied, but the yields were definitely influenced by the manure applied a year previously. Further manures (as above) were applied, and the results of the second ratoon crop show very decided benefits from fertilizer. The following demonstrates the relative importance of the three constituent plant foods:—

Due to—							Increase. Tons per acre.
Sulphate of ammonia	..	..	..	..	..	..	6.6
Superphosphate	..	..	..	..	..	..	Nil
Muriate of Potash	..	..	..	..	..	..	2.9

The value of sulphate of ammonia on old ratoons is seen from these returns. In addition, the potash deficiency of the red volcanic loam is also in evidence, while phosphates have produced no beneficial results. A suitable fertilizer for this land is 3 to 4 cwt. per acre of Sugar Bureau No. 3 mixture, followed by subsequent dressings of sulphate of ammonia, say $1\frac{1}{2}$ cwt. per acre for plant cane and 3 cwt. for ratoons.

L. Zielke's Farm, Sandhills Road, Bundaberg.

Soil Type.—Red volcanic loam.

Nature of Crop.—Plant Cane.

Variety.—Q. 813.

Age of Crop.—14 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	20.8	16.0	..	..	..
160	240	..	24.3	16.0	1 18 0	3 11 0	..
160	..	180	23.3	16.2	2 10 0	2 2 0	..
..	240	180	23.1	16.0	2 2 0	1 10 0	..
160	240	180	22.8	16.0	3 0 0	0 3 0	..

DISCUSSION.

A heavy crop of green manure was ploughed under while this block was in fallow. The beneficial influences of this treatment were probably responsible for the slight increases in crop experienced with the manures subsequently applied.

Although all treated plots gave yields in excess of the check (no manure) plots, the results were erratic, and it is not possible to attribute the gain to any specific plant food. It is hoped that the first ratoons will supply more definite information.

Windermere Plantation, Bundaberg.

Soil Type.—Red volcanic loam **Nature of Crop.**—First Ratoon.

Variety.—P.O.J. 213.

Age of Crop.—14 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	23.2	14.0	..	..	..
240	240	..	30.4	14.4	2 7 0	8 9 0	..
240	..	180	29.8	14.3	2 19 0	6 13 0	..
..	240	180	23.0	14.0	2 2 0	..	2 7 0
240	240	180	31.3	14.2	3 9 0	7 12 0	..

DISCUSSION.

This trial was commenced with the first ratoons, and outstanding benefits from fertilizer have been recorded. An analysis of the relative increases from the individual plant foods is interesting:—

Due to—						Tons per acre.
Nitrogen	..	..	..	..	..	8.3
Phosphoric acid	..	..	..	..	..	1.5
Potash	..	..	..	..	..	0.9

Nitrogen has once again proved to be the most important plant food for ratoons. Where no sulphate of ammonia was applied, the crop yield was no better than from the unfertilized plots.

On the basis of the above returns, best results should follow from a moderate application of Sugar Bureau No. 2 mixture, at the rate of, say, 3 cwt. per acre; this should be followed by top dressings of sulphate of ammonia to give 2 cwt. per acre for plant cane and 3 cwt. for ratoons.

Varietal Trials.

In the October issue of the "Quarterly Bulletin" the available returns from varietal trials in the Bundaberg area were reported. Since that date further experimental blocks have been harvested and the results are recorded herewith. These supply further evidence in the favour of the new varieties—Co. 290, P.O.J. 234, P.O.J. 2878, and P.O.J. 2875—as high-yielding gum-resistant canes.

The returns from the Maroochy area are of special interest in that they show the behaviour of P.O.J. 234 and Co. 290 under the excessively wet soil conditions which were experienced in that district through 1934. In this respect they exhibited a decided superiority to the older standard canes, Q. 813 and H.Q. 285.

Mrs. N. M. Connelly's farm, Maroochy River.

Soil Type.—Alluvial loam.

Age of Crop.—14 months.

YIELDS.

Variety.	Cane per Acre.		C.C.S. in Cane.	
	Tons.		Per cent.	
H.Q. 285	24.6		14.9	
P.O.J. 2379	23.4		13.9	
Co. 281	24.2		12.1	
P.O.J. 234	31.3		14.6	
Co. 290	39.7		12.6	

The abnormally heavy rainfall experienced in the Maroochy River area during the 1934 growing season adversely affected crop yields. This was particularly the case on alluvial land where drainage difficulties exist. In this trial, Co. 290 demonstrated its decidedly superior qualities under wet conditions. It made vigorous growth even when the standard varieties were suffering due to water-logging of the soil.

The standard (H.Q. 285) showed the highest c.c.s. value, though it was little in advance of P.O.J. 234 in this respect; considering both tonnage per acre and c.c.s., P.O.J. 234 was decidedly superior.

Failure of the Co. 290 to attain a normal c.c.s. value under wet conditions is in accordance with our experience elsewhere with varieties which flourish on wet lands. For some reason they never attain a satisfactory maturity. This point requires further investigation.

F. M. Schleger's Farm, Qunaba.

Soil Type.—Brown volcanic loam.

Age of Crop.—13½ months.

YIELDS.

Variety.	Cane per Acre.		C.C.S. in Cane.	
	Tons.		Per cent.	
Q. 1098 (Standard)	40.9		12.2	
P.O.J. 2379	37.8		13.5	
P.O.J. 234	38.6		14.4	
P.O.J. 2878	39.4		12.8	
Co. 290	48.7		13.5	

All canes showed excellent results under the favourable growing conditions experienced. The standard (Q. 1098) outyielded all but Co. 290, but was inferior in c.c.s., as shown by the latest maturity test figures given above. When the crop was harvested certain of the canes were used for further plantings while the balance were put through the mill. The mill c.c.s. results of the latter further emphasise the superiority of the new canes in this respect:—

	Per cent.	
Q. 1098	14.2	
P.O.J. 2379	15.6	
P.O.J. 2878	15.8	

It must be concluded that Co. 290 was superior to all other canes in this trial.

Messrs. David Bros' farm, Kowbi, Childers.

Age of Crop.—14 months.

YIELDS.

Variety	Cane per acre.	
	Tons.	
D. 1135	7.4	
P.O.J. 2379	9.9	
P.O.J. 979	11.6	
P.O.J. 234	13.0	
Co. 290	15.0	

Crop growth on this block was not as satisfactory as one might wish, yet the new varieties performed very favourably in comparison with the standard D. 1135. P.O.J. 234 and Co. 290 were particularly outstanding, and appear to be definitely suited to these growing conditions.

C.C.S. results for the separate varieties are not available, and therefore a true evaluation of the respective returns cannot be made. It would be safe to conclude, however, that the heavy-yielding varieties were superior in every particular to the D. 1135, and their ratooning qualities should be definitely better.

H. M. Limpus's Farm, Petrie's Creek, Nambour.

Soil Type.—Alluvial loam.

Age of Crop.—13 months.

YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons,	per cent.
Q. 813	10.2	15.7
P.O.J. 2878	18.4	12.7
P.O.J. 2875	19.0	13.3
P.O.J. 234	19.2	14.3
Co. 290	24.7	12.2

Co. 290 has distinctly out-yielded all other varieties in this trial, while the standard Q. 813 was an almost complete failure. The growing conditions were decidedly unfavourable for Q. 813, due to excessive rains. On the other hand, the continued growth of the Co. 290 resulted in failure of the crop to mature, and the c.c.s. was rather low. This is almost inevitable under such conditions. P.O.J. 234 gave a reasonable crop yield, combined with a fair c.c.s. value. It is doubtful, however, if the variety could be grown free from mosaic disease under these conditions.

THE HISTORY OF THE

REIGN OF KING CHARLES THE FIRST

IN THE

REIGN OF KING CHARLES THE FIRST

BY

JOHN BURNET

OF THE UNIVERSITY OF OXFORD

IN TWO VOLUMES

LONDON





